Claims

1. A charge control circuit for a battery pack comprising rechargeable battery elements (9) which are arranged in respective parallel branches (3) of a parallel circuit of battery voltage sources, characterized
in that each parallel branch (3) has associated state monitoring means (11, 13, 17) for monitoring the battery state of the battery voltage source represented by the parallel branch (3) during a charging process of the battery pack, and in that a respective switch (15), which can be controlled by the state monitoring means (11, 13, 17), is provided in each parallel branch (3) for interrupting or releasing the charge current flow through the parallel branch (3) on the basis of the battery state.

2. The charge control circuit as claimed in claim 1, characterized in that the state monitoring means (11, 13, 17) of a parallel branch (3) are set to switch the controllable switch (15) to the interrupted state when it detects a battery state "parallel branch fully charged".

3. The charge control circuit as claimed in claim 1 or 2,
characterized in that the parallel branch (3) are formed from identical groups of series-connected battery elements (9) which are connected in series with the respective controlled switch (15).

4. The charge control circuit as claimed in one of the preceding claims,
characterized in that the state monitoring means (11, 13, 17) comprise temperature sensors (11) for detecting the battery temperature in the individual parallel branches (3).

5. The charge control circuit as claimed in claim 4, characterized in that the state monitoring means (11, 13, 17) of a relevant parallel branch (3) are set to switch the controllable switch (15) of the parallel branch (3) to the interrupted state when the battery temperature detected by the temperature sensor (11) in the parallel branch (3) exceeds a predetermined temperature value.

6. The charge control circuit as claimed in one of the preceding claims, characterized in that the state monitoring means (11, 13, 17) comprise current measuring devices (13, 17) for detecting the current flowing through the individual parallel branch (3).

7. The charge control circuit as claimed in claim 6, characterized in that the state monitoring means (11, 13, 17) are set to switch the controllable switch (15) of the relevant parallel branch to the interrupted state when the charge current flowing through the parallel branch (3) exceeds a predetermined current value for the duration of a predetermined time interval.

8. The charge control circuit as claimed in one of the preceding claims, characterized in that the state monitoring means (11, 13, 17) are set to switch the controllable switch (15) of the respective parallel branch (3) to the interrupted state when the change in the battery temperature per unit time exceeds a comparison value depending on the respective charge current through the parallel branch (3).

9. The charge control circuit as claimed in one of the preceding claims,

characterized in that the state monitoring means (11, 13, 17) comprise a safety timer (13), and in that the state monitoring means (11, 13, 17) switch the controllable switch of the respective parallel branch to the interrupted state when a charge time interval, which is determined by the timer (13) on the basis of the charge current flowing through the relevant parallel branch (3), has expired.

10. The charge control circuit as claimed in one of the preceding claims,
characterized in that the state monitoring means (11, 13, 17) comprise a respective microprocessor (13) per parallel branch (3) for the purpose of controlling the respective switch (15).

11. A discharge control circuit for a battery pack comprising rechargeable battery elements (9), which are arranged in respective parallel branches of a parallel circuit of battery voltage sources (3),
characterized
in that each parallel branch, in series with the battery voltage source (3) comprising one or more battery elements (9) which is represented by it, has a respective controllable switch (15) having an integrated diode (23), or one which is connected in parallel therewith, which is conductive in the discharge current flow direction, state monitoring means (13) being provided and set so as to switch the controllable switch (15) from a high-resistance state to a low-resistance state when a discharge current having a minimum current level flows through the diode (23).

12. The discharge control circuit as claimed in claim 11,

characterized in that the controllable switches (15) are transistors, in particular field-effect transistors.

13. The discharge control circuit as claimed in claim 11 or 12,
characterized in that the state monitoring means comprise at least one microprocessor (13, 19), preferably at least in each case one microprocessor (13) for each parallel branch (3).

14. A battery control circuit, comprising the charge control circuit as claimed in one of claims 1 - 10 and the discharge control circuit as claimed in one of claims 11 - 13 combined therewith.

15. A battery pack having the charge control circuit as claimed in one of claims 1 - 10 integrated therein and/or having the discharge control circuit as claimed in one of claims 11 - 13.